

CLAIMS

What is claimed is:

1. An air pump unit, comprising:
a pressure housing having a pressurized interior, an air inlet and air outlet;
a pump assembly disposed in the pressurized interior of the pressure housing having a reciprocating member disposed along a stroke axis for drawing air into the pressure housing through the air inlet; and
a solenoid valve assembly disposed within the pressurized interior of the pressure housing controlling flow of the pressurized air in the pressure housing through the air outlet.
2. The pump unit of claim 1, further including a vibration isolation mount at an exterior of the pressure housing.
3. The pump unit of claim 2, wherein the isolation mount is made from a resilient material.
4. The pump unit of claim 3, wherein there are two isolation mounts located at opposite walls of the pressure housing along a line essentially parallel to the stroke axis.
5. The pump unit of claim 1, wherein the reciprocating member is a permanent magnet shuttle and wherein the pump assembly further includes an electromagnet driving the shuttle along the stroke axis.
6. The pump unit of claim 5, wherein the electromagnet includes two wire coils electrically coupled in parallel.
7. The pump unit of claim 5, wherein the pump assembly further includes a pair of diaphragms mounted to opposite ends of the shuttle across diaphragm openings in opposite walls of the pressure housing.

5

8. The pump unit of claim 7, further including a pair of valve heads mounted over the diaphragm openings including intake and exhaust valves controlling flow from the air inlet to a downstream side of each diaphragm and from the downstream side of each diaphragm to the interior of the pressure housing.

9. The pump unit of claim 8, wherein the valve heads mount to the pressure housing by retention tabs.

10. The pump unit of claim 8, wherein there are two air inlets controlled by intake valves of the valve heads.

11. The pump unit of claim 10, wherein the air inlets are cavities formed in a side of the pressure housing.

12. The pump unit of claim 11, wherein the cavities contain filter elements.

13. The pump unit of claim 1, wherein the pressure housing includes a cover mounted to an open side thereof.

14. The pump unit of claim 13, wherein the cover includes a fitting for an air line in communication with the air outlet.

15. The pump unit of claim 14, wherein the cover includes a mount for the valve assembly.

16. The pump unit of claim 15, wherein the mount is a partition wall dividing the interior of the pressure housing into two compartments containing the piston assembly and the valve assembly and defining at least one air flow passageway between the compartments.

17. The pump unit of claim 1, wherein the valve assembly includes a second solenoid valve controlling flow through a second air outlet in communication with the interior of the pressure housing.

18. The pump unit of claim 17, wherein the solenoid valve assembly includes a third solenoid valve controlling flow through a vent outlet.

19. The pump unit of claim 18, wherein when the associated solenoid valve is open air from a source connected to one of the air outlets of higher pressure than the interior of the pressure housing passes through the associated air outlet into the pressure housing and when the third solenoid valve is open out of the pressure housing through the vent opening.

20. The pump unit of claim 1, wherein air from the air inlet flows through the interior of the pressure housing directly past the pump assembly.

21. A compact air pump and valve package, comprising:

a pressure housing defining two inlet ports and a plurality of fittings for connecting air lines to an interior of the pressure housing;

5 a linear diaphragm pump assembly disposed in the pressure housing having a permanent magnetic shuttle reciprocated along a stroke axis by an electromagnet, the shuttle mounting at opposite ends a pair of diaphragms across diaphragm openings in opposite walls of the pressure housing enclosed by a pair of valve heads having intake and exhaust valves controlling flow from the inlet ports in the pressure housing to downstream sides of the diaphragms and
10 to the pressure housing interior so as to draw in and pressurize air inside the pressure housing; and

a valve assembly having a plurality of solenoid valves disposed within the pressurized interior of the pressure housing, each solenoid valve being operable to control flow from the pressure housing through an associated one of the
15 plurality of fittings.

22. The package of claim 21, wherein there are three fittings and three solenoid valves each independently controlling flow through one of the fittings, wherein two fittings are coupled to separate air bladders and one fitting is coupled to ambient pressure, wherein opening one of the solenoid valves controlling flow to one of the fittings coupled to one of the air bladders and opening the solenoid valve controlling flow to the fitting coupled to ambient pressure vents the pressure in the interior of the pressure housing to deflate the associated air bladder.